

Advance and Queue Cutter Signals

*Presented for: NCDOT Signal Technician Workshop
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Issue

The most ignored sign on our roads?



R8-8

Issue

- Intersections (Stop Sign or Signal Controlled) adjacent to Railroad Crossings are hazardous, often forcing vehicles to stop on Railroad tracks.
- Despite signs warning not to stop on tracks, motorists frequently do.
- Traffic signals are designed with preemption to clear queue off tracks in advance of train
- Some drivers see and/or hear the approaching train and panic, looking for an escape, no longer paying attention to traffic signals

Issue

- In the days and weeks following a fatal car-train collision in Durham in December 2009, NCDOT and city of Durham personnel were at the crossing handing out safety pamphlets and warning people not to stop on tracks.
- Despite this, and new signs, motorists were still stopping on the tracks with NCDOT and Durham personnel PRESENT.

Engineering Problem

As trains get faster and highways more congested, how can we better engineer crossings and signals to prevent queuing on the tracks and reduce or eliminate the risk of car-train collisions?

Grade separation is the ultimate goal, but not always the immediate, most economical, or practical solution.

Obstacles

Laws are in place to prevent stopping on the tracks, but they are not enforced

- Stopping on tracks is usually never ticketed, even after a collision
- Motorists ignore Railroad signals, often trying to beat them instead
- Traffic signals used at railroad crossings have shown better compliance, but use is somewhat limited now by *MUTCD*

2009 MUTCD

Warrant 9 (new) provides criteria for installing a traffic signal at an intersection adjacent to a railroad crossing that otherwise might not meet warrants for a signal.

While a (intersection/downstream) signal can help to clear tracks, it still does not prevent motorists from stopping on the tracks

Possible Solutions

If a signal is installed at an intersection, there are ways to compliment the signal and try to reduce vehicle queuing:

- Advance heads (in advance of crossing) as part of intersection
- Queue cutter signal

Any solution is still 100% dependent on the motorist to obey the traffic control devices present to be effective

Advance Signal: Hoskins Street in High Point

- Existing city owned flasher that was upgraded to a fully operational signal
- Single track crossing being widened to double track
- ~50 trains a day, up to 79 MPH, with potential for 90-110 MPH in future
- Short throat – little to no storage room between the tracks and the intersection

Advance Signal: Hoskins Street in High Point



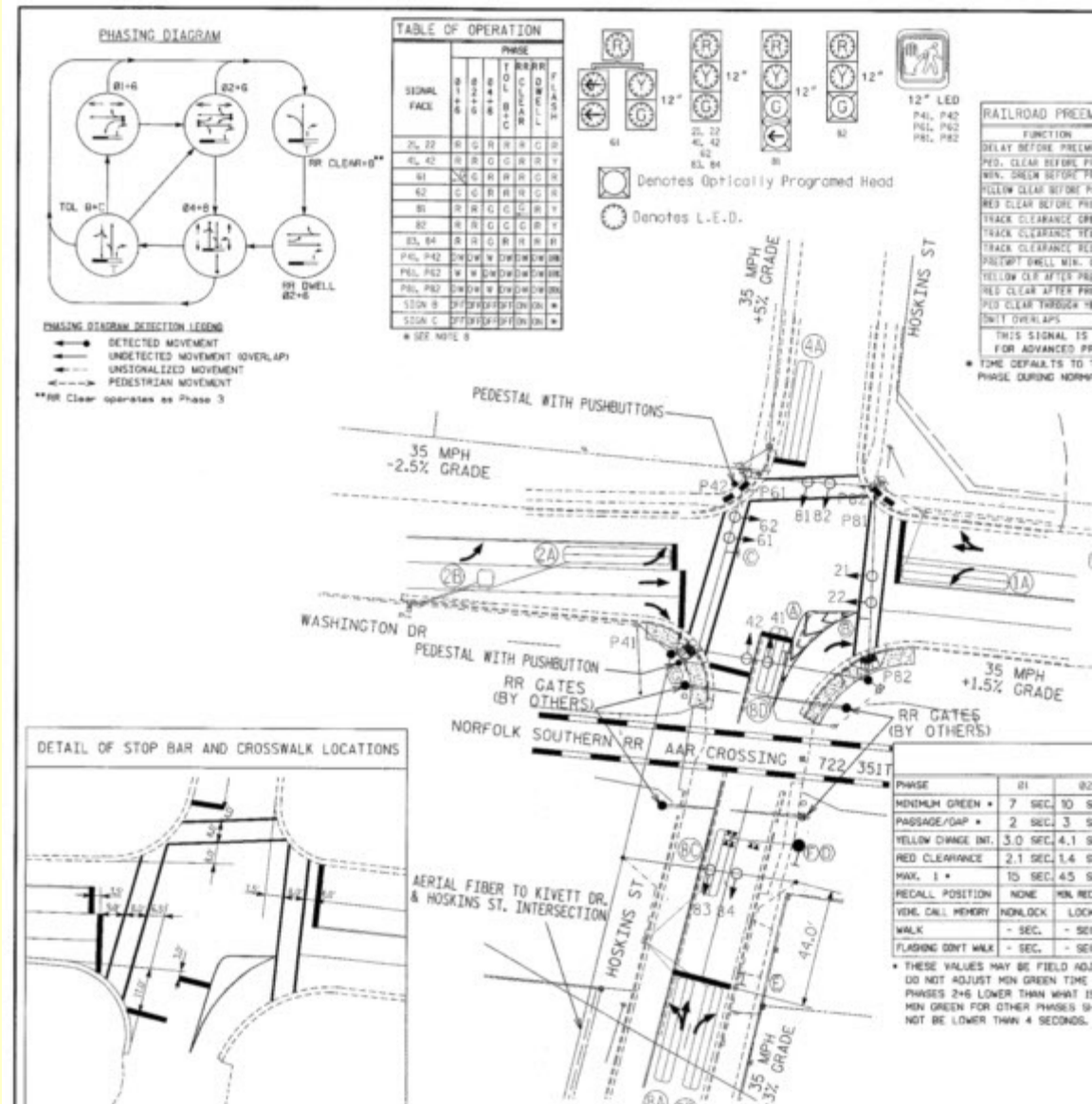
Advance Signal: Hoskins Street in High Point

Even though signal was designed with Railroad Preemption, there were concerns about queuing on/across the tracks

Advance signal heads were used in advance of the RR gates to stop traffic

Advance heads operate as a timed overlap to the main signal (wired to same cabinet), stopping traffic before the tracks, but allowing throat between advance heads and main signal to clear before completing transfer of right of way (completing phase)

Advance Signal: Hoskins Street in High Point



Advance Signal: Hoskins Street in High Point



Typical cycle at Hoskins Street

Advance Signal: Hoskins Street in High Point



Timed Overlap Clearance to Red

Advance Signal: Hoskins Street in High Point



How well does it work? Like any other signal...

Queue Cutter Signal: Dillon Road in Jamestown

- Existing signal (07-1268) not preempted (but should have been?)
- Single track crossing being widened to double track (Closer to intersection)
- ~50 trains a day, up to 79 MPH, with potential for 90-110 MPH in future
- Tracks cross about 60° angle to road about 175-300 feet from intersection
- Frequent trucks and school busses

Queue Cutter Signal: Dillon Road in Jamestown



Queue Cutter Signal: Dillon Road in Jamestown

Existing signal at Main Street would include RR preemption, but the clearance time was excessively long and there were concerns about queuing on/across the tracks

A queue cutter was used with signal heads in advance of the RR gates to stop traffic.

Queue cutter was operated by a separate cabinet (07-2127), but was still interconnected to Main Street signal and also to railroad for preempt

Queue Cutter Signal: Dillon Road in Jamestown

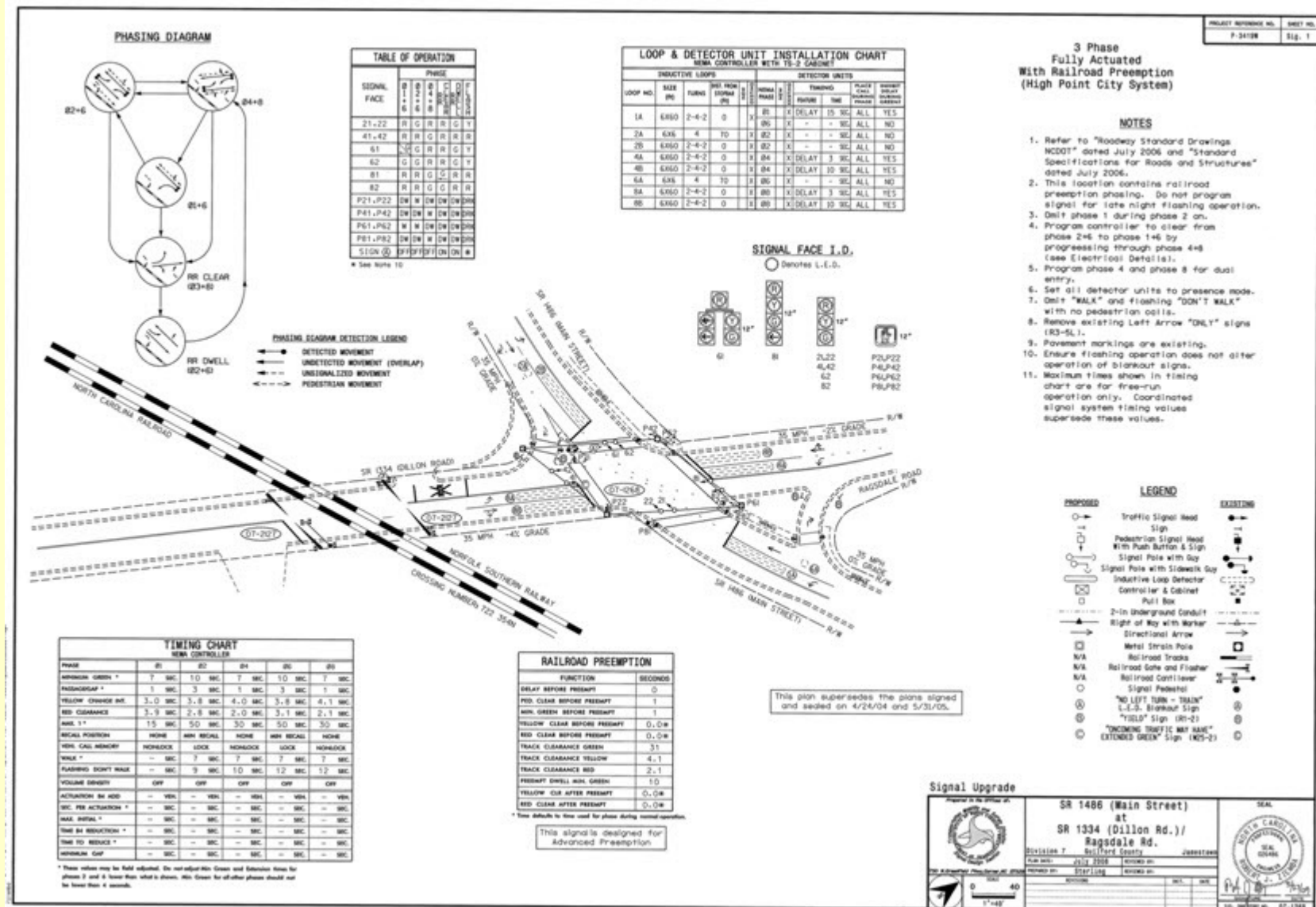
Loops are located about 30 feet beyond railroad exit gates in “throat”

After 5 seconds of steady detection, queue loops activate and recognize that “throat” is full, causing queue heads to turn red -> any additional vehicles will stop before tracks

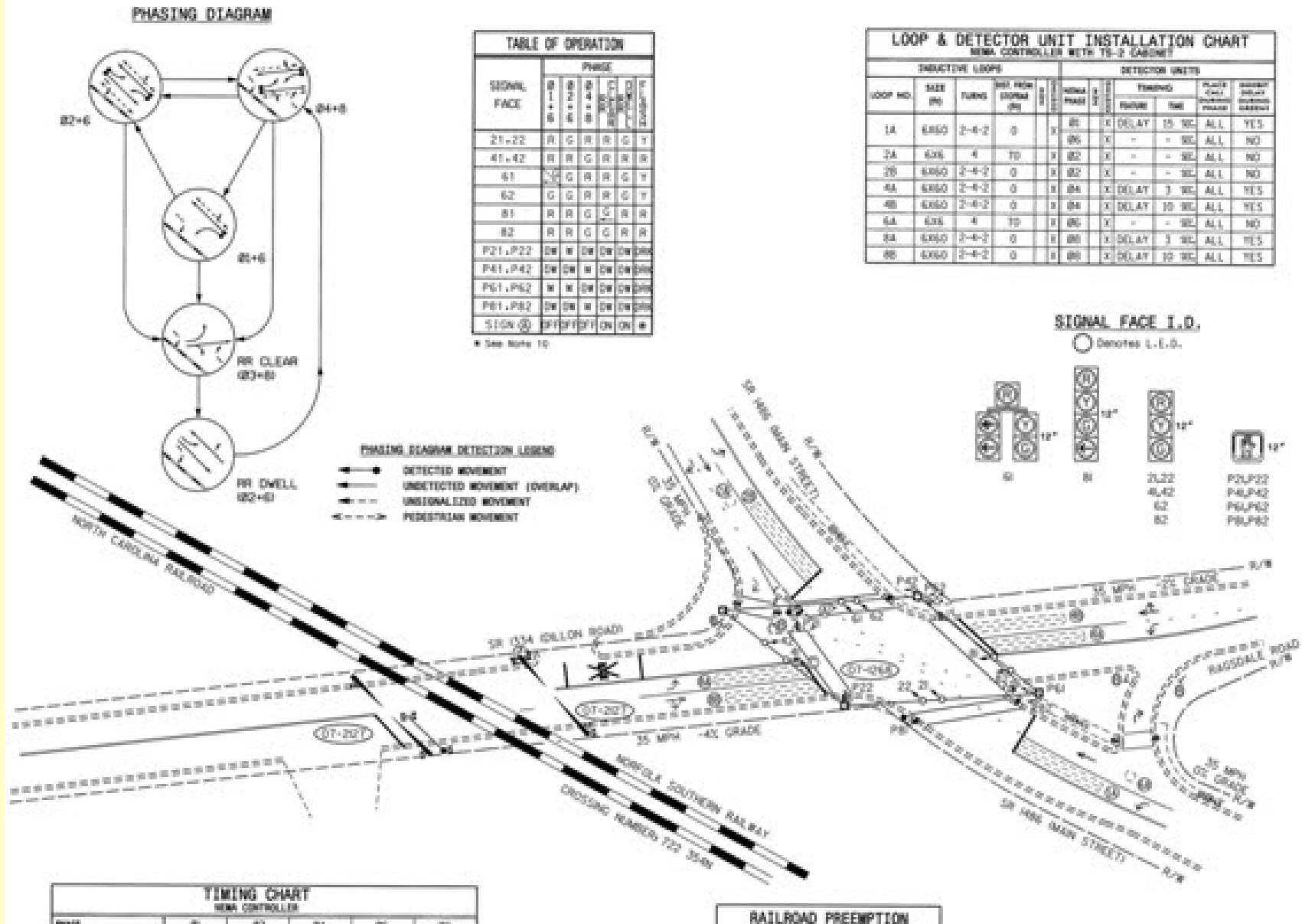
Queue cutter will remain red until Dillon Road receives green at Main Street Signal

Queue cutter heads are designed for simultaneous preemption with railroad; they go red immediately while Main Street signal serves Track Clear Green

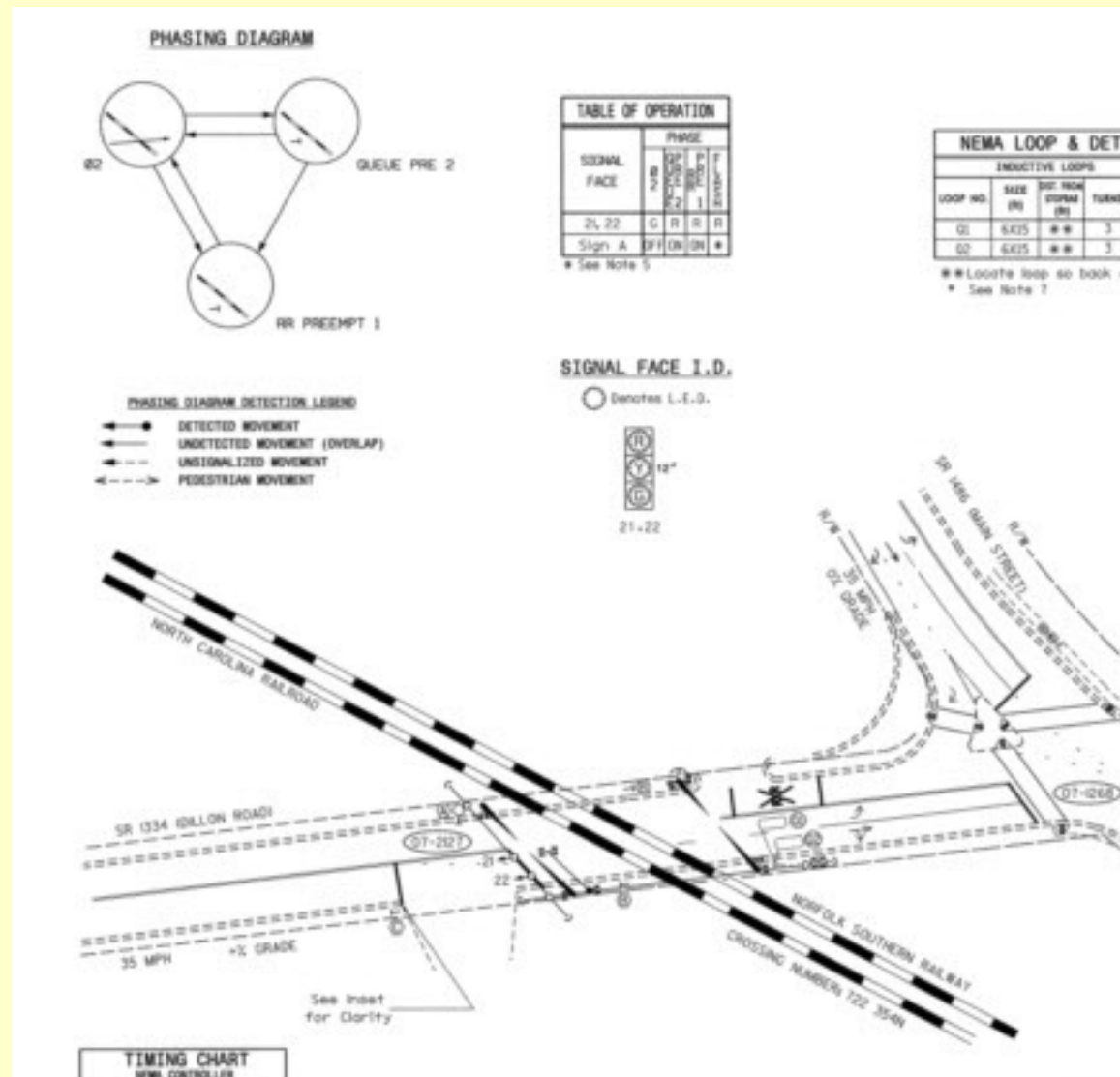
Queue Cutter Signal: Dillon Road in Jamestown



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Dillon Road Queue Cutter Cycle

Queue Cutter Signal: Dillon Road in Jamestown



Dillon Road Queue Cutter Preempt Activation

Queue Cutter Signal: Dillon Road in Jamestown



Dillon Road Queue Cutter Preempt Release

Queue Cutter Signal: Dillon Road in Jamestown



Blankout Sign for Industrial Driveway

Queue Cutter Signal: Dillon Road in Jamestown



Dillon Road Queue Cutter Railroad Preemption

Queue Cutter Signal: Dillon Road in Jamestown



How well does it work? Just like any other signal...

Discussion and Questions?